



The University of Chicago
Department of Statistics
Master's Seminar

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“Bayesian Analysis of Extreme Events with Time-varying Parameters”

**TUESDAY OCTOBER 4, 2005, at 9:30 AM
110 Eckhart Hall, 5734 S. University Avenue**

ABSTRACT

In this paper we analyze the extremal events using generalized Pareto distributions (GPD), allowing the shape parameter of GPD to vary with time. We use a mixture model that combines a parametric form for the center and a GPD for the tail of distributions, in which the uncertainty about the threshold is explicitly considered. We introduce the use of dynamic linear model (DLM), a very general class of time series models, to model the shape parameter changes across time. Prior hyperparameters are assigned in accordance with the maximum likelihood estimates of the model parameters. Posterior inferences are obtained through Markov Chain Monte Carlo (MCMC) methods. Simulations are carried out in order to analyze the performance of our proposed model. We also apply the proposed model to three real data sets, Dow Jones Index, S&P 500 Index and Bovespa Index, that present many extreme events.